United States Patent [19]

Langheinrich

[11] **3,752,290**

[45] **Aug. 14, 1973**

[54] **ADVANCED MECHANISM FOR INKED RIBBONS OR THE LIKE**

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[22] Filed: **Mar. 29, 1971**

[21] Appl. No.: **128,963**

[52] **U.S. Cl.** **197/162**

[51] **Int. Cl.** **B41j 33/46**

[58] **Field of Search** ..... 197/151, 153, 153 A, 197/160, 161, 162, 163, 164, 165, 175; 101/336

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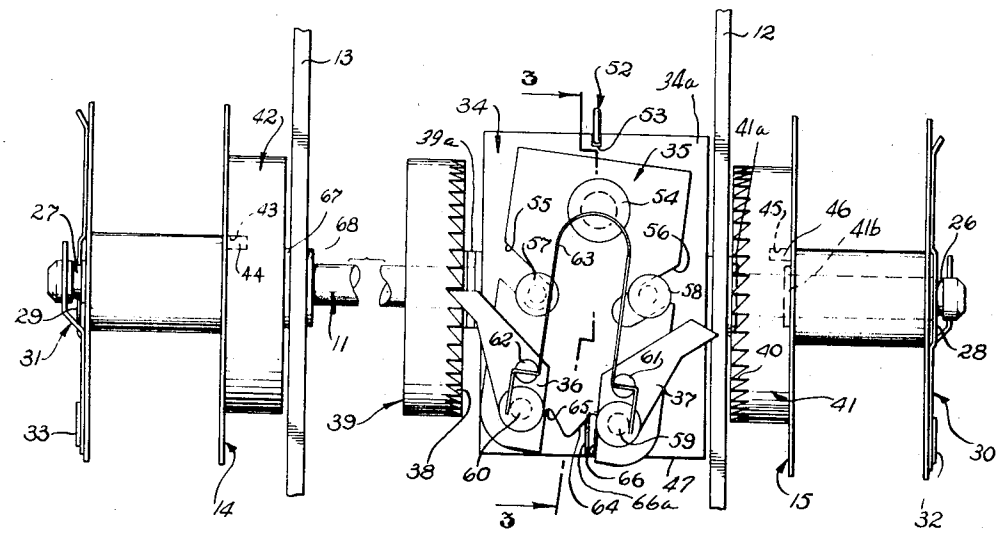
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[57] **ABSTRACT**

A mechanism for advancing and reversing an inked ribbon in a counter-printer or the like. A bistable device holds two pivoted pawls which selectively advance ratchet wheels. At each end of the ribbon, the bistable device changes position by a direct pull of the ribbon.

5 Claims, 4 Drawing Figures



Patented Aug. 14, 1973 3,752,290

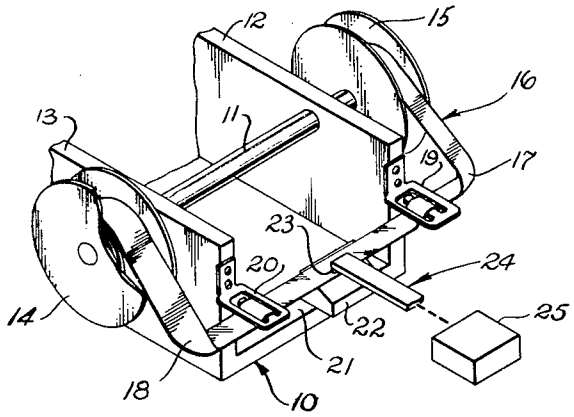


Fig. 1.

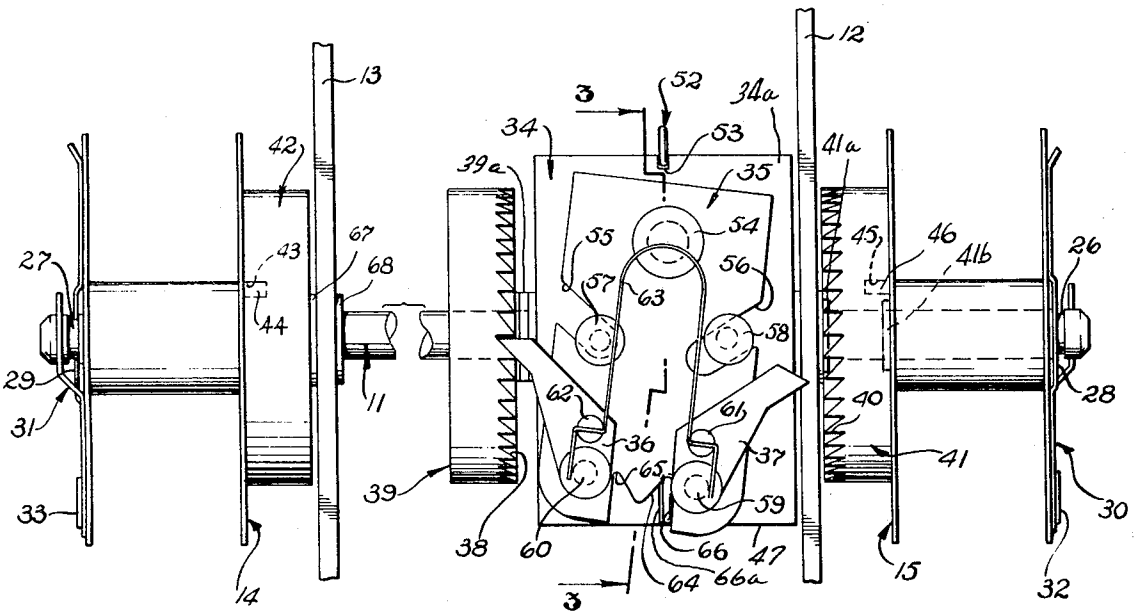


Fig. 2.

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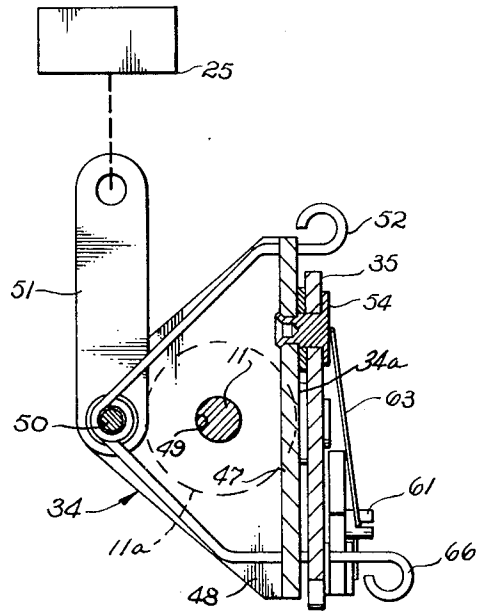


Fig. 3.

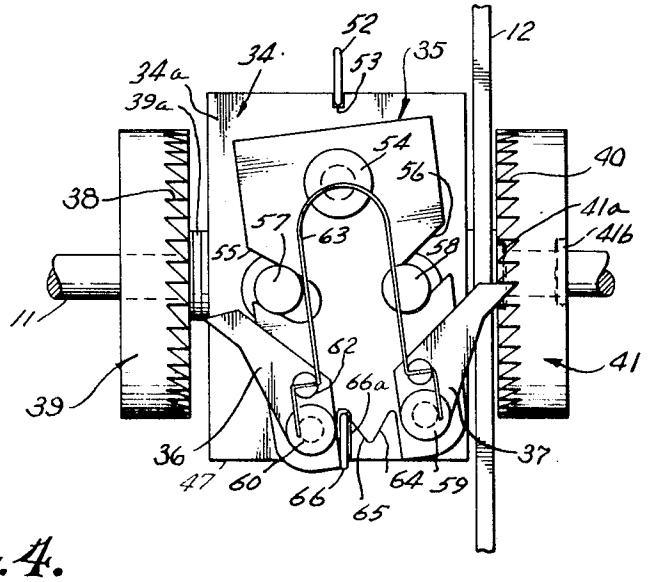


Fig. 4.

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ADVANCED MECHANISM FOR INKED RIBBONS OR THE LIKE

BACKGROUND OF THE INVENTION

This invention relates to devices for producing incremental advances and reversals of controlled member movement, and more particularly, to a device having two output ratchets and means actuable to selectively advance either one of the ratchets.

The present invention is not to be limited to those uses set forth herein; however, it has been found to be especially useful in advancing and reversing the inked ribbon of a counter-printer. For example, the invention may be used with a counter-printer of the type disclosed in U. S. Pat. No. 3,429,258.

In the prior art, the mechanisms used in typewriters to advance an inked ribbon by increments and also to reverse its direction of travel when a spool has run out, are old and well known. However, these and other devices have several serious disadvantages. For these and other reasons, these devices cannot easily be used on counter-printers or the like.

In the past, ribbon advancing and reversing mechanisms have been expensive because of their relatively large number of small component parts. Parts duplication also has been required because of the relatively large distance between and orientation of the ribbon spools. Due to the large number of small parts, tooling has also been expensive. Prior art mechanisms have also been unreliable because of the many parts and their small size. It has also been impossible to easily change the separation between spools. The small size of the parts also has made prior art mechanisms highly susceptible to damage.

SUMMARY OF THE INVENTION

In accordance with the mechanism of the present invention, two ratchet wheels are mounted in spaced relation coaxially on the same shaft. A bistable device then drives either one, but only one, wheel at a time in increments.

In accordance with a feature of the invention, a ribbon spool may be detachably fixed relative to each wheel concentric with the shaft. When the spool of one driven wheel runs out of ribbon, the bistable device changes positions to drive the other wheel.

From the foregoing, it will be appreciated that the bistable device may be made of a few relatively large component parts and is, therefore, less expensive. No parts duplication is required. Tooling and assembly are less expensive. The invention is thus inherently very reliable. Further, different shaft lengths may be used for various sizes of printing equipment. The large size of the component parts also make the invention rugged.

The ribbon drive mechanism (with automatic reversing) of the present invention utilizes a standard commercial adding machine type ink ribbon and spools of which each end is firmly affixed to its corresponding spool by conventional means, not shown.

The ink ribbon is approximately 6 yards long (216 inches) and the nominal feeding increment is 0.16 inch. The feeding increment varies around the nominal feeding increment directly as the diameter of the ribbon contained on the "Wind" spool changes.

By thus varying the feeding increment and with the extreme length of the ribbon, the longest possible service life of the ink ribbon is obtained. This is explained as follows:

1. Each time a character printing occurs, an amount of ink is drawn from the ribbon and deposited on the paper. Repeated printings in one place on the ribbon would deplete the ink supply and make the ribbon useless. Tests have shown that approximately 25 to 30 prints void the ribbon of ink when printing of varied characters in any one area of ribbon is made. It can thus be seen that in varying the feed increment continuously, as the device of the present invention does, maximum use of the ink supply contained therein is obtained.

2. Regardless of the ink supply, continued printing of characters in any one place on the ribbon causes a fraying of the ribbon cloth. It again can be seen that a varied feed increment and long length of ribbon minimizes print impacts on any specific area of the ribbon and promotes extreme long life.

The device of the present invention differs from the prior art several ways. Some of these ways are described in the following:

FIRST EXAMPLE

One printer uses a molded plastic block of porous material which is impregnated with a suitable ink. The ink used dries out on the shelf and the block, since it is non-moving, indents in the area of printing. The block is inexpensive and easily replaced; replacement, however, must be frequent.

SECOND EXAMPLE

Another printer uses a non-moving silk ribbon which, as explained in the foregoing item number 2, has short life due to fraying. In addition, the end of the ribbon is positioned in an ink well to provide ink replenishment. At times the ribbon becomes too wet and, when printed upon, the excessively wetted ribbon "throws" ink around the printer.

THIRD EXAMPLE

Still another prior art printer uses a continuous feeding twenty inch long inked ribbon which, because of a small initial ink supply, is caused to pass through an ink well. Again, the problem of excessive wetting, and consequent splashing, is experienced and, although feeding and of relatively long length, the ribbon life is limited by fraying of the ribbon cloth.

The above-described and other advantages of the present invention will be better understood from the following detailed description when considered in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing which is to be regarded as merely illustrative:

FIG. 1 is a perspective view of one embodiment of the present invention;

FIG. 2 is a top plan view of additional structure employed in accordance with the present invention;

FIG. 3 is a transverse sectional view of a yoke assembly taken on the line 3—3 shown in FIG. 2; and

FIG. 4 is a top plan view of a portion of the apparatus of the present invention illustrating a second mode of operation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing, in FIG. 1, a frame is indicated at 10 through which a shaft 11 projects. Frame 10 has wings 12 and 13. Shaft 11 projects to the left of wing 13 and to the right of wing 12. Shaft 11 is rotatable in wings 12 and 13.

Spools 14 and 15 are provided around each corresponding end of shaft 11. Spools 14 and 15 are inked ribbon spools and may be entirely conventional. Spools 14 and 15 may, for example, be of the type currently used on many adding machines.

Spools 14 and 15 carry an inked ribbon 16. Ribbon 16 makes bends at 17 and 18, and is threaded through brackets 19 and 20. Brackets 19 and 20 may be entirely conventional, if desired.

Frame 10 has a cross-member 21 to which a platen 22 is fixed. A type font 23 may thus be brought to bear against ribbon 16 by a hammer 24 which carries type font 23. A conventional mechanism 25 may be employed to operate hammer 24. An inked impression of the type font 23 may be transferred to a piece of paper (not shown) by inserting the paper (not shown) between ribbon 16 and platen 22.

The present invention may be easily combined with, if desired, the counter-printer apparatus disclosed in U. S. Pat. No. 3,429,258.

As shown in FIG. 2, snap rings 67 and 68 are provided in corresponding grooves in shaft 11 on each side of wing 13 to hold the shaft 11 in fixed axial position relative to wings 12 and 13. As is conventional, shaft 11 has grooves at 26 and 27 into which knife edges 28 and 29 fit, respectively. Knife edges 28 and 29 are provided on conventional brackets 30 and 31, respectively, which are pivoted at pivot points 32 and 33, respectively.

Each of brackets 30 and 31 is clamped at its pivot point 32 and 33, respectively so as not to move readily. However, both brackets 30 and 31 may be moved manually. In one position thereof, spools 14 and 15 may be removed from shaft 11 for a change of ribbon 16. In the other position, brackets 30 and 31 prevent spools 15 and 14, respectively, from moving to the right and to the left as viewed in FIG. 2, respectively, off of the ends of shaft 11.

In FIG. 2, a yoke 34 is rotatable on the shaft 11. The yoke 34 has a flat outer surface 34*a* which lies in a plane tangent to an imaginary cylinder 11*a* concentric with the shaft 11. The yoke 34 carries a plate 35 which, in turn, carries pawls 36 and 37. Pawl 36 engages teeth 38 of a ratchet wheel 39. Pawl 37 engages the teeth 40 of a ratchet wheel 41. However, when pawl 36 engages teeth 38, pawl 37 does not engage teeth 40, and vice versa.

Ratchet wheel 39 is fixed to shaft 11. A wheel 42 is also fixed to shaft 11. That is, neither wheel 39 nor wheel 42 is rotatable relative to shaft 11 or slidable axially thereon. Wheel 42 has an eccentric recess 43 into which a pin 44 extends. Pin 44 is fixed to spool 14. Pin 44 is thus slidable out of recess 43 when spool 14 is removed from shaft 11.

The break shown in shaft 11 in FIG. 2 is to indicate that the distance between wheels 39 and 42 may be of any magnitude. In other words, frame 10 may have any width desired.

Wheel 41 may be fixed relative to shaft 11 by snap rings 41*a* and 41*b*. That is, wheel 41 is rotatable relative to shaft 11 but is not sidable axially thereon. As before, wheel 41 has a recess 45 into which a pin 46 projects. Pin 46 is fixed relative to spool 15. Thus, when spool 15 is removed from shaft 11, pin 46 is slidable out of recess 45.

As shown in FIG. 3, yoke 34 has a center portion 47, and two wing portions 48, only one of which is shown in FIG. 3. The wing portions 48 are located at the corresponding opposite ends of portion 47. Shaft 11 projects through holes 49 in wing portions 48. Yoke 34 is thus rotatable about the axis of shaft 11. The yoke 34 is fixed axially on the shaft 11 by being positioned between a boss 39*a* on fixed wheel 39 and frame wing 12. A pin 50 is fixed to each wing portion 48, and carries a link 51 rotatable thereon which is operated by mechanism 25, shown in FIG. 1. A wire spring 52 is also wound about pin 50 and extends into a notch 53, as shown in FIG. 2.

As shown in FIG. 3, plate 35 is rotatable about a rivet 54 through portion 47 of yoke 34. The axis of the rivet 54 extends transversely to the axis of the shaft 11.

Plate 35 has slots 55 and 56 through which guide pins 57 and 58 project. Guide pins 57 and 58 are fixed to yoke portion 47.

Pawls 36 and 37 are pivoted on plate 35 at pivot points 60 and 59, respectively. The axes of the pivot points 59 and 60 extend generally parallel to the axis of rotation of the plate 35, namely, the axis of the rivet 54. Thus, the pawls 37, 36 are pivotally movable in a plane parallel to the plate 35. Pawls 36 and 37 have studs 62 and 61 fixed thereto which carry a wire spring 63 that biases the pawls 36, 37 apart. Plate 35 has notches at 64 and 65. A lower portion of spring 52, indicated at 66 in both FIGS. 2 and 3, passing through a vertically extending slit 66*a* in yoke center portion 47 may thus fall into either one of the notches 64 and 65.

OPERATION

In the operation of the invention shown in the drawing, mechanism 25, through link 51, rocks yoke 34 back and forth during each impression made by type font 23 on ribbon 16 by the hammer 24. Each time, if the plate 35 is in the position shown in FIG. 2, ratchet wheel 39 is rotated two or more teeth. Since wheel 39, wheel 42 and spool 14 are all fixed relative to shaft 11, spool 14 thus moves. This operation is repeated until the spool 15 has no further ribbon 16 to supply. As is conventional, when the ribbon 16 runs out, the ribbon 16 is fixed to the spool 15. Spool 14 will then no longer turn. The rocking action produced by mechanism 25, i.e., the oscillation of yoke 34, will then cause plate 35 to move from the position shown in FIG. 2 to the position shown in FIG. 4. This is true because wheel 39 will be held in a fixed position, and the bias of spring 63 will, through pawl 36, transfer the resisting force to the plate 35. Further, the pin connection 60 of pawl 36 will also supply a couple about rivet 54. Plate 35 will then change positions. Note that in FIG. 2, pawl 36 engages a tooth 38 of wheel 39. However, pawl 37 does not engage any tooth 40 of wheel 41. On the other hand, in FIG. 4, pawl 37 does engage a tooth 40 of wheel 41, and pawl 36 does not engage any tooth 38 of wheel 39.

In accordance with the foregoing, when a spool (either 14 or 15) runs out of ribbon 16, one of the ratchet wheels 39 or 41 will be held stationary, and the plate

35, while attempting to move the fixed ratchet wheel 39 or 41, will transfer either from the position shown in FIG. 2 to the position shown in FIG. 4 or vice versa.

What is claimed is:

1. A mechanism for moving an inked ribbon or the like, said mechanism comprising: a frame; a shaft; means to mount said shaft in a position rotatable relative to said frame; a yoke rotatably mounted relative to said shaft; means to maintain said yoke in a fixed axial position relative to said shaft; first and second ratchet wheels mounted concentrically on said shaft, each ratchet wheel having a plurality of teeth extending axially toward each other, said yoke being located in between said ratchet wheels; means to maintain said first ratchet wheel in a fixed axial but rotatable angular position relative to said shaft, said second ratchet wheel being fixed relative to said shaft; a first spool rotatable on said shaft on the side of said first ratchet wheel opposite said teeth thereon; means to hold said first spool in a fixed position relative to said first ratchet wheel; a second spool mounted concentrically on said shaft in a position spaced from one side of said second ratchet wheel, said one side being the side thereof opposite the side thereof on which said teeth are positioned; means to hold said second spool in a fixed position relative to said shaft; bistable means pivotally mounted on said yoke about an axis extending transversely to said shaft, said bistable means including a first spring to bias said bistable means to lie at rest in only one of first and second stable positions at a time; first and second pawl means mounted on said bistable means for movement in a plane generally parallel to the path of movement of said bistable means, said first and second pawl means including a second spring and first and second pawls, said second spring biasing one of said first and second pawls to engage said first and second ratchet wheels, respectively, when said bistable means is in said first and second positions, respectively, said first pawl means being out of engagement with said first ratchet wheel when said second pawl means is in engagement with said second ratchet wheel, and vice versa; and advance means to oscillate said yoke in a manner to cause one of said first and second pawl means to advance a corresponding movable ratchet wheel at least one increment for each yoke oscillation, oscillation of said yoke with one ratchet wheel fixed causing said bistable means to change from one of said first and second stable positions to the other of said first and second stable positions.

2. The invention as defined in claim 1, including means to mount said shaft in a fixed axial position relative to said frame, an inked ribbon having a first end fixed to said first spool and a second end fixed to said second spool, a pair of brackets fixed relative to said frame to carry said ribbon flat thereacross, pressure means actuable to force a piece of paper and said ribbon against at least one piece of type with the ribbon between said paper and said type, said advance means including a linkage connected between said pressure means and said yoke to cause one oscillation of said yoke each time said pressure means is actuated, and detent means to hold said bistable means in said first and second stable positions thereof.

3. A selective advancing mechanism comprising: a frame; first and second ratchet wheels rotatable with respect to each other about a first axis extending through said frame, said first and second ratchet wheels having first and second sets of teeth thereon, respectively; bistable means; a first spring to cause said bistable means to lie at rest in only one of first and second stable positions at a time in between said ratchet wheels; said bistable means comprising a plate pivotally mounted about a second axis extending transversely to said first axis; pawl means engaging said first and second ratchet wheels when said bistable means is in said first and second stable positions, respectively, said pawl means lying out of engagement with said first ratchet wheel when said second ratchet wheel is engaged, and vice versa; said pawl means including a pair of arms movable in a plane generally parallel to said plate; advance means actuable to oscillate said bistable means to advance one of said ratchet wheels one predetermined increment for each bistable means oscillation so long as said one ratchet wheel is movable; means to stop movement of said one ratchet wheel, the reactive force of said stopped one ratchet wheel being transmitted to said bistable means via said pawl means to change the position thereof when said bistable means is oscillated by said advance means; a shaft rotatable on said frame about said first axis, said first ratchet wheel being rotatable relative to said shaft and said second ratchet wheel being fixed relative to said shaft; said advance means including a yoke rotatable on said shaft between said ratchet wheels, means to hold said yoke in a fixed axial position on said shaft, means to hold said first ratchet wheel in a fixed axial position on said shaft, said advance means oscillating said yoke about said shaft, said yoke having a flat outer surface portion lying in a plane tangent to an imaginary cylinder concentric with said shaft, said plate being pivoted to said surface portion midway between said ratchet wheels, said plate having two contiguous V-shaped notches in one end thereof, said surface portion having a slit therethrough midway between said ratchet wheels, said first spring being a spring metal wire, said first spring being fixed relative to said yoke and extending through said slit into one of said notches, said notches being divided by a V-shaped projection, said first spring riding over said projection into the other notch when a sufficient force is applied in the correct direction to said plate, said first spring thereby acting as a detent to hold said plate securely in only one of said first and second stable positions at a time, and each said arms of said pawl means being biased toward said first and second ratchet wheels, respectively.

4. The invention as defined in claim 3, wherein said stop means includes a first spool detachably fixed relative to said first ratchet wheel concentric therewith, and a second spool detachably fixed relative to said shaft concentric therewith.

5. The invention as defined in claim 4 wherein said stop means further includes an inked ribbon having first and second ends fixed to said first and second spools, respectively, print means to press a piece of paper on top of said ribbon against a piece of type, said advance means including a linkage connected between said print means and said yoke to oscillate said yoke once each time said print means causes a character to be reproduced on said paper, and means to guide said ribbon off of either one of said spools, between the type and the paper, and back onto the other of said spools.

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